

former, the main trunks affect a bilateral position, those of the latter are dorso-abdominal; that, with one doubtful exception, the blood system is closed, while the tracheal system always (that of a few aquatic larvæ excepted) communicates by means of spiracles with the external atmosphere.

7. That the tracheal and blood systems of Insects come into conjunction *only* at the peripheric segments,—the main trunks of each observing separate courses.

8. That the periphery of the circulating fluid system of Insects is constructed in exact conformity with the Crustacean model, the blood flowing in *imparietal* channels, in and through which the capillary tracheæ are conducted, floating in the nutritive fluid.

I remain, Gentlemen,
Your obedient Servant,
THOMAS WILLIAMS, M.D.

BIBLIOGRAPHICAL NOTICES.

Insecta Maderensia; being an Account of the Insects of the Islands of the Madeiran Group. By T. VERNON WOLLASTON, M.A., F.L.S. London: 4to, pp. 634, plates 13.

SOME persons are singularly qualified for producing a work on the natural history of a country. To give one instance:—Otho Fabricius, a Danish clergyman, spent some years of his life in Greenland, and thus acquired an intimate knowledge of that Arctic land, which modern discovery begins to show must be an immense archipelago bound by one great band of ice. When he left Denmark, with but little knowledge of natural science, but ardently desirous of studying the works of Him, whose word "*ut Missionarius ordinatus, ab honoratissimo Collegio de cursu Evangelii promovendo,*" it was his calling to proclaim, Fabricius took with him, in 1768, that natural-history cyclopædia of the time, the '*Systema Naturæ*' of Linnæus, and, urged by those who ordained him, to study Arctic natural history at his leisure hours, he returned in six years with great materials for a Physical, Geographical and Historical History of Greenland. In May 1779 he wrote the preface of a portion of this work, the '*Fauna Grœnlandica,*' which was accordingly published next year, and the character of which may be best given in the words of Cuvier: "*Ouvrage précieux par l'extrême exactitude des descriptions.*" It is the work of a diligent, observing man, limited by climate to a highly interesting, but comparatively narrow, field. He has but few books to distract him, and but few bibliographical researches to make.

Mr. Wollaston, though he went to a tropical climate, was singularly happy in having such an atmosphere as envelopes an ocean-girt island of limited size, 250 miles distant from a continent

with a distractingly large fauna and flora. When he went, Mr. Wollaston was regarded by naturalists as one of our ablest entomologists. The more minute the *Coleopteron*, the more he seemed to love it; for beetles he searched the bogs and lakes and mountains of Ireland and Scotland, and surveyed his native land from Newcastle to the Chesil-bank—the said bank being a most prolific “field” under the eye of such an “explorer.” Mr. Wollaston did not confine himself to collecting, neither did he leave the “minims of nature” to be determined, by comparison merely, with named specimens in the collections of friends or in the great museum of his country. He was a scholar and fond of books; a Cambridge M.A., with tastes like his, regards the Latin of Cicero and Tacitus, of Virgil, Horace and Juvenal, as pedantic when introduced into the technicalities of science, and so he looks with sympathy on the energetic, though often unclassical, language of men not generally trained in Halls. Like Gray of Pembroke, Mr. Wollaston, of Jesus College, was a naturalist by taste and by study. He “worked out” descriptions, and thus “served before the mast,” before he tried to guide the ship. He was intimate with the structure of his little friends, and saw how wonderfully their hooks and spines and notches and hairs and lobes and appendages are adapted to the peculiar habits and “œconomy” of insects.

Hard study at college demanded relaxation, and his health induced him to seek it in a mild and distant climate. He was happy in knowing a clergyman long resident in Madeira and familiar with some departments of natural history, such as Fishes, Mollusks and Plants, with which he (Mr. Wollaston) was less acquainted, while this friend, the Rev. R. T. Lowe, having great local knowledge, directed him to many a favourite spot. Richly was Mr. Wollaston’s teacher in Mollusca rewarded by his indefatigable pupil;—but we must refrain, and proceed to the work on the Coleoptera of Madeira.

The author went to Madeira three times, and so arranged his visits that he got collections in every month of the year. Having collected with the utmost zeal and preserved his treasures with the greatest care and neatness, he brought his insect collections to England, and commenced arranging and classifying them. He had not limited himself, as most British collectors do, to the Coleopterous productions of his native land, but had a knowledge as well as specimens of most of the Coleoptera, indigenous to Europe and the shores of the Mediterranean; in truth he had studied the faunæ of those lands which most closely resembled Madeira in their animal productions. Not wishing to anticipate any one, or to interfere with what had been done before, and which possibly, in the labyrinth and mazes of journals, might have escaped his notice, Mr. Wollaston visited the continental collections, and with great openness submitted his insect treasures to the sight of the various “spécialistes.” Like Horace, too, he was in no hurry,—he could afford to wait; and though he did not literally adopt the Horatian maxim and keep his MS. for nine years, he made entomologists impatient, by his very carefulness. And at last the work is out. We might object to

its size—μέγα βιβλίον, κ.τ.λ.—we could also say that he published so large a work at much too cheap a price, and its plates are printed on too thick paper, though beautifully made and toned; but the Madeira invalid could not hold even an octavo, so a sumptuous quarto is just as “get-at-able,” and the collector, among the towering rocks of Madeira, would do well to have with him no pocket manual but one, for he will find it hard work to “carry” himself over much of the ground. The plates have the advantage of having been engraved by an able entomologist, Mr. F. Smith, from the fine drawings of Mr. Westwood, that walking cyclopædia of knowledge in Annulosa. The work is not a mere technical work,—it is filled with passages of great interest to the student of the geographical distribution of animals, and must ever form a prized volume in his library, from its completeness and its excellence. It is curious, too, to know that there is no Tiger-beetle in Madeira, though only a short distance from a continent which produces the *Manticora*, that largest of the family, the pale night-loving *Platychile*, the Algerine *Megacephala*, and perhaps fifty species of true *Cicindela*. It is strange to be told, that in an island with plenty of wood (Madeira means “woody”) there is no *Buprestis**, and yet in Africa *Buprestidæ* of large size and endless variety, from hairy-tufted *Julodes* and felspar-reflecting *Sternocera*, to minute *Anthaxiæ* and *Agrii*, abound; Madagascar having a peculiar Buprestidous fauna of its own, full of rare magnificence. Africa is a land of *Elateridæ*, from the great *Tetralobus* and *Leptophyllus* with their leaf-plated antennæ, to the genera of smaller size, and yet but one “skip-jack” or “click-beetle” rewarded the assiduity of Mr. Wollaston, and he found that *Elater* in Porto Santo. Africa is the country of Goliath Beetles and of an endless variety of *Cetoniadæ*, which pasture on the sap and sugar and pollen of its flowery vegetation, but this family has only one representative in Madeira, and even that is a very doubtful native. In fact the number of Lamellicorns is so few, that it is strange to one, who would expect *Dynastidæ* and *Lucanidæ* in so tropical and so well-wooded a country. It seems to abound in *Curculionidæ*, and some of the genera of these “snouters” are peculiar to it, such as *Laparocerus*. Its *Heteromera*, its *Ptinidæ*, are abundant. Mr. Wollaston records 539 species of Coleoptera as found in Madeira. These species belong to 228 genera—upwards of 30 of which are not as yet recorded as occurring elsewhere. Of the 13 sections into which the order Coleoptera is subdivided, the *Rhynchophora*, as we have remarked, contain the largest number of species (110), whilst the *Hydradephaga* and *Eucerata* present the smallest, each of them numbering but 8. To Madeira proper belong 478 species, to Porto Santo 155, to the Dezerta Grande 77, to the Southern Dezerta 31, to the Ilheo Chão 23; or to employ Mr. Wollaston’s words in another place, “If we choose to regard the Dezertas as one, the group will

* Mr. Wollaston, on a fourth visit, has detected a single species of *Agrius*, and also one of the family *Pselaphidæ*; we may here say that we have often contemplated, with delight, the fine series of type specimens of “*Insecta Maderensia*” now preserved in the British Museum.

separate itself into 3 natural divisions; and we shall have, for Madeira proper 478, for the Dezertas 87, and for Porto Santo 155. Only 8 species have been hitherto discovered on *every* island of the cluster—nevertheless 10 more are *all but* universal (if indeed, as is probable, they are not so entirely).” We may transfer to our pages the following note on one of the prime rarities of the place, the highly interesting genus so aptly named *Deucalion* by its describer: a second species from the Salvages, remote rocks in the Atlantic, is described by the author at p. 433, from specimens obtained by his friend T. S. Leacock, Esq. of Funchal.

We may mention, that on an island almost antipodal to Madeira, Lord Howe’s Island, the late able Naturalist of H.M.S. ‘Herald,’ Mr. John Macgillivray, found a third species (*D.?* *Wollastoni*, n. s.), or rather a species of a closely allied genus, which may prompt, to the mind of some geologist, an idea bearing on the great continent Atlantis, of which the lovely Madeira seems to be one of the few remnants above water. The following extract we copy from p. 430,—it contains all the remarks on *Deucalion*,—as likely to give the general reader some idea of the attractive nature of the book even to him:—

“There is no genus, perhaps, throughout all the Madeiran Coleoptera, more truly indigenous than *Deucalion*. Confined apparently, so far as these islands are concerned, to the remote and almost inaccessible ridges of the two southern Dezertas, it would seem to bid defiance to the most enthusiastic adventurer who would scale those dangerous heights. Its excessive rarity moreover, even when the localities are attained, must ever impart to it a peculiar value in the eyes of a naturalist; whilst its anomalous structure and sedentary mode of life * give it an additional interest in connexion with that ancient continent of which these ocean ruins, on which for so many ages it has been cut off, are the undoubted witnesses. Approximating in affinity to *Parmena* and *Dorcadion*, yet presenting a modification essentially its own, it becomes doubly important in a geographical point of view; and it was therefore with the greater pleasure that I lately received, from T. S. Leacock, Esq., of Funchal, a second representative from the distant rocks of the Salvages (midway between Madeira and the Canaries),—on which we may almost pronounce for certain that an entomologist had never before set foot. Differing widely in specific minutiae, yet agreeing to an identity in everything generic, they offer conjointly the strongest evidence to the *quondam* existence of many subsidiary links (long since lost, and radiating in all probability from some intermediate type) during the

* “When we consider indeed the apterous nature of *Deucalion*, its subconnate elytra, and its attachment (at any rate in the larva state) to the interior of the stems of particular, local plants, or its retiring propensities within the crevices of rocks, we are at once struck with the conviction that, during the enormous interval of time which has elapsed since the mighty convulsions which rent asunder these regions terminated, it has probably never removed many yards from the weather-beaten ledges which it now inhabits.”

period when the whole of these islands were portions (and perhaps very elevated ones) of a vast continuous land.

“ In the details of their trophi the genera of this section of the *Eucerata* are so nearly similar, that we must not look, even in otherwise anomalous forms, for any very striking irregularities there. And yet the mouth is not altogether uncharacterized in *Deucalion*, since its laterally-rounded upper lip, long and acuminate palpi (the basal joint of which is broadly sinuated externally, as in *Blabinotus*), together with its unusually produced and deeply bilobed ligula, at once remove it from *Dorcadion*,—from which moreover its largely developed and exceedingly uneven prothorax (a hinder zone of which is suddenly constricted, as though by a wide and tightened belt, and is ribbed with *transverse* plaits), added to its curiously pitted and tubercular elytra, will still further serve to separate it. In some respects perhaps it is more akin to *Parmena* than to *Dorcadion*: nevertheless its comparatively gigantic size, and the contracted, plicate, posterior band of its (otherwise) greatly wrinkled prothorax, apart from the above-mentioned peculiarity of its elytral sculpture (one of the most remarkable features which it possesses), and its freedom from the dense elongated pile which is more or less evident in all the members of the former, will equally distinguish it from that group also.

“ Amongst other singularities, a tendency (which I have likewise observed, occasionally, in the *Morimi*) to have one of their elytra a little shorter than the other is strongly indicated in the *Deucaliones*. Thus, of my two examples of the *D. Desertarum* one is very decidedly so constituted; and, out of eight of the *D. oceanicum* it is traceable in no less than three. Like many of their allies in this department of the Longicorns, they are gifted with the capability of making a grating or hissing noise,—the *modus operandi* in producing which (since I have not been able to meet with any explanation of it altogether satisfactory) I have taken some pains to investigate. The solution given by Mr. Westwood, in his admirable ‘Introduction to the Modern Classification of Insects’ (vol. i. p. 356), would seem to come nearest to the truth, but still it does not quite apply to the species under consideration,—which are moulded, thus far, on one and the same principle. Mr. Westwood states that the sound is generated by the friction of a polished portion of the *scutellum* against the edge of the prothoracic cavity. In *Deucalion*, *Parmena* and *Dorcadion*, however, there is a narrow space, in the shape of an isosceles triangle (the apex being turned towards the scutellum), which occupies *nearly the entire length* of the mesonotum, and which, from its brightness, appears at first sight to be perfectly smooth. When viewed however beneath the microscope, this longitudinal area is seen to be composed of very fine, transverse, parallel and acute ridges, closely set together after the manner of a file: and it is by depressing and raising the prothorax (an act which alternately exposes and re-covers the upper region of the *extremely cylindrical* mesothorax) that its under side is brought to play against this inner dorsal file,—by which process the stridulation is effected. In order

to convince myself of the reality of this, I have relaxed many specimens of the genera in question, and have caused the sound artificially with the greatest ease.

“Hence, we can immediately appreciate the object of the broadly constricted basal margin of the prothorax of *Deucalion*, which is so regulated that it may present a more perfect and continuous surface to the mesothorax,—whilst, by being more tightly drawn as it were over that especial part, it is made likewise to grate more vigorously against the lower file. This transverse, coarctate ring is not expressed at all in *Dorcadion*, and it is but faintly suggested in a few of the *Parmenæ*: so that we should *à priori* have expected that the stridulating power of *Deucalion* would be more effectual than is there the case. And such, on inquiry, we find to be a fact: for so loud is the sound which the *D. Desertarum* is able to accomplish, that the only individual which has come under my notice in a recent state I heard at a considerable distance; and the second example as yet detected was described by the Rev. R. T. Lowe (who obtained it from the extreme summit of the Ilheo Bugio, or Southern Dezerta) as emitting a ‘buzzing noise, somewhat resembling that of a Humblebee.’ Everything indeed in this strange genus seems designed to give full effect to these, far from unmusical, inter-thoracic notes; for, in addition to the hinder contracted belt already mentioned, the pronotum of *Deucalion* is furnished with an exceedingly deep, rounded, postmedial fovea, which (since it projects beneath) must evidently form an extra instrument of impact to sweep over the mesothoracic file,—when its head (and, simultaneously, its prothorax) is by turns lowered and upraised. In the Salvagian representative this impression is less developed than in the Dezertan one; nevertheless it exists in them both,—conjointly with the other structural characters above enumerated.

“*Deucalion Desertarum*, Wollast.

“Apparently of the utmost rarity, the only two specimens which I have seen having been captured on the respective summits of the Middle and Southern Dezertas. The one from the former was taken by myself, during a week’s sojourn in that desolate spot, with the Rev. W. J. Armitage, in January 1849. I extracted it from a crevice of an exposed weather-beaten peak (where it had secreted itself, in company with the *Scarites abbreviatus* and several species of *Helops*) at the immediate point where the great central heights commence to narrow into an almost perpendicular ridge nearly 2000 feet above the sea. Although I searched with the greatest diligence, I could not obtain more; nor indeed was I able to procure it during a subsequent encampment on the island, with the Rev. R. T. Lowe, at the end of May 1850,—even though I visited the identical crag and split open the fissures, both of it and of the hardened volcanic mud in all directions around it. The second example hitherto detected is from the still more perilous steps of the Ilheo Bugio, or Southern Dezerta, and it is to the Rev. R. T. Lowe that we are indebted for this interesting contribution to the fauna of that almost

unapproachable rock. Having, on the 3rd of July 1849, succeeded in reaching the summit, not without much difficulty and at the greatest peril (in the pursuit principally of land mollusca and plants), Mr. Lowe informs me that he met with it beneath a slab of stone, and that he was attracted (as already mentioned) by its remarkable, stridulating noise. So local indeed does this insect seem to be, that it, apparently, has not extended itself even over the Dezerta Grande (where there are no external obstacles to bar its progress); but retains the very position which in all probability constituted its original centre of dissemination at the remote period of time when this ancient continent received its allotted forms. Judging from the slowness with which creatures of such habits must necessarily (under any circumstances) be diffused, it is at least unlikely that the present one could have circulated far, when the now submerged portions of that region began to give way; and hence it is not impossible that the Southern Dezerta with the adjacent part (then united to it) of the Central one may have embraced the *whole area* of its actual primæval range,—the remains of which (though they be now separated by a channel) it still continues to occupy, and from which, even where physically unimpeded, it has never roamed.”

We may also quote the following passage from p. 113—of general and great importance on the oft-mooted and much-disputed question of species; it occurs as a note to the description of *Olibrus bicolor*, and refers to the distinctions between it and *Olibrus liquidus*:—

“There can be no doubt but that the present insect and the following one approach each other very closely, and it is not without hesitation that I have treated them as separate. For some time indeed I had considered them to be but modifications of the *O. bicolor*; nevertheless a careful comparison of a very large series of specimens has subsequently induced me to believe that they are truly distinct, since there is no difficulty whatsoever in discriminating them in a general way, even though it is equally certain that about two examples out of every forty which I have examined are doubtful, and might apparently be referred to either. Still, the normal states are so clearly expressed that I cannot regard these occasional links as more than exceptional varieties from either side, and which would fall as unmistakably into their proper spheres as any of the remainder, were we better able to grasp their exact characteristics, and to appreciate small shades of difference which are not the less real because obscure. Nor must we forget that in our ignorance of even the nature of ‘species,’ so called, we may sometimes err in attempting to define too rigidly the boundaries of their attributes; for, whilst, as a matter of course, we must unquestionably assume them to be absolutely unconnected (that is to say, to have descended from common parents,—each of their peculiar kind), yet it is difficult to assert positively that creatures which in outward points are thus intimately allied are of necessity *so* opposite in their endowments that they may not now and then intermix, and produce those very aberrations (albeit perhaps not able, themselves, to perpetuate their race) which we are apt to lay hold of, even when occurring thus sparingly,

to destroy the specific claims of the insects which have accidentally given them birth. And I should frequently, therefore, be inclined to look upon such-like media as *lapsus naturæ* rather than as connective,—at any rate where they are only of rare experience and exist between forms the limits of which are otherwise clear and unambiguous. With these few remarks, which I have somewhat prolonged, as likely to apply in instances besides the present one, it will be sufficient to add that the *O. bicolor* (which, if my identification of it be correct, would appear to attain a rather larger size in Madeira than the ordinary type) may be distinguished, for the most part, from *O. liquidus*, not merely by its superior bulk, but by its less posteriorly-acuminated outline, by its usually just perceptibly darker and less brassy hue, and by its legs and antennæ being, almost invariably, both of a more diluted testaceous tinge and (proportionably) a trifle longer. It is an abundant insect, during the spring and summer months, in certain parts of Madeira, at rather low and intermediate elevations. In May of 1849, whilst encamped in the Ribeiro de Santa Luzia with the Rev. R. T. Lowe, I captured it in the utmost profusion from amongst the long grass and flowers immediately outside my tent,—and in company with the *O. liquidus*, which thus, at all events, cannot be a *local variety* of it.”

The mere British collector who *studies* as well as *names* his insects should get this work, if he has not already got it, on account of the many valuable “clearings” and detailed descriptions of British genera. In this aspect the book is singularly valuable and important, and did space permit, we could refer to many passages in proof. We may perhaps hope to see the other orders described by Mr. Wollaston; and we trust that his present noble and costly contribution will not stand long alone, but will be followed by at least another volume, which will certainly never appear, unless its author be encouraged by the sale of this splendid volume, and unless, too, he conscientiously thinks, that he will be promoting the knowledge of the marvellous works of an Almighty hand. Such a work will then form, so far as the insect portion of the multitudinous Annulosa is concerned, a *point* for the historian of the geographical distribution of animals to reason on; and should Messrs. Lowe and Wollaston ever publish an illustrated volume on the Land Mollusca of Madeira, the zoologist and palæontologist will be supplied with data for reasoning on the extremely difficult but intensely interesting question of the “distribution” and what is called “extinction” of species. Insects, Crustacea—especially the Entomostraca—and Snails (Madeira is a Helico-metropolis) form certainly the most lasting animated features of any land; drought and other circumstances which destroy Mammalia, Birds, Fishes, Reptiles and other orders having hardly any perceptible influence on these enduring works of “Him, who made the worlds.”